

DRAFT DFG COMMENTS

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Mr. Lester Snow
CALFED Bay-Delta Program

July 28, 1997

Review of Draft Programmatic Environmental Impact Report/Environmental Impact Statement
Environmental Impacts Technical Report Fisheries and Aquatic Resources and the Draft
Affected Environment Technical Report for Fisheries and Aquatic Resources

The Department of Fish and Game (Department) has reviewed CALFED's Draft
Programmatic Environmental Impact Report/Environmental Impact Statement Technical Report
for Fisheries and Aquatic Resources (DEIR/DEIS) and the Draft Affected Environment
Technical Report for Fisheries and Aquatic Resources. The Department offers the following
comments for your consideration.

Draft Programmatic Environmental Impact Report/Environmental Impact Statement Environmental Impacts Technical Report Fisheries and Aquatic Resources

General Comments

The short comment period requested by CALFED enabled the Department of Fish and Game (Department) to provide a cursory review of the Draft Programmatic DEIR/DEIS. In order to provide CALFED with a thorough review of the DEIR/DEIS and its potential impacts, the Department will require significantly more review time and a complete resource library. A complete resource library includes: all flow modeling data required to do a thorough analysis of operations, changes in flow patterns, and affects of new or enlarged storage facilities (upstream and downstream); documents referred to in the DEIR/DEIS that have not been provided to the review staff; a description of the Alternatives; and a description of the Common Programs.

Beneficial impacts directly related to the Alternatives should be distinguished from beneficial impacts associated with the Common Programs and mitigation. Beneficial impacts discussed in the alternative comparisons sound like benefits that should be attributed to the ERPP Common Program. As written, the DEIR/DEIS does not provide a clear description of the Common Programs and their relationship to the Alternatives. CALFED should provide separate discussions of the Alternatives and their impacts; the Common Programs and their impacts (beneficial and adverse); and then a discussion of how these two relate. The current discussion provided in the DEIR/DEIS is not adequate to determine impacts.

Several sections refer to habitats that will be modified or destroyed and created; these sections require thorough discussion. To properly evaluate the Alternatives, the reviewer needs to know the habitat types that are affected. For example, a project that removes 200 linear feet of riprapped levee is likely to have significantly fewer impacts than a project that removes 200 or even 100 linear feet of shaded riverine aquatic habitat. In addition, habitats may have greater or lesser value depending on their location. Finally, it is important to remember that even when creating habitat, the existing habitats value is important. Serious consideration should be required before the removal of one habitat type for another. Natural habitats are difficult to replace and even the best created habitat will have a different species diversity, composition, and abundance than a natural form of the same habitat type. Whenever possible, CALFED should acquire and protect existing good-quality habitats.

The definition of ecosystem restoration has been molded predominantly into a physical framework that tends to ignore or downplay biological realities. This first occurs in Table 3 where assessments of the 3 alternatives are summarized. Species and species interactions are included as a factor for alternative comparisons; however, they are among 15 factors and there is no clear framework describing how these factors will be balanced in making programmatic decisions. For instance, if entrainment of a given species is reduced, and flows and water temperatures are improved a little bit in one section of the species range but higher exports in the Delta seriously constrain the reproductive success of the species/stock and human uses thereof, will the physical improvements alone be used to justify a statement of no significant impact? Will improvements in flooded island habitat outweigh impacts to species not using those habitats (off site not in-kind mitigation)? How will cumulative impacts be assessed? Will they use the same 15 factors? Among the 15 factors there is autocorrelation (e.g., flow and sediment supply and movement) such that rating of the alternative may become subjective. Thus, we now have a programmatic ecosystem restoration document, probably followed by supplemental documents that use yardsticks or measures to assess the significance of impacts that may overlook and tend to downplay critical biological functions in the ecosystem. If the species don't respond as anticipated to the physical changes how then do we mitigate the impact of the ecosystem change?

Targets set under CALFED could actually result in taking away public mitigation for previous impacts without offsetting that loss. If the CALFED ecosystem restoration program truly provides improved physical habitat conditions to the extent that biological functions can naturally offset past (and CALFED's) mitigation responsibilities then maybe the programmatic and supplemental documents need to be very specific about this aspect.

The DEIR/DEIS does not clarify how the ecosystem will be restored while increasing diversions.

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A major shortcoming of this report is the lack of operations studies to allow quantifiable assessments of impacts. Throughout the DEIR/DEIS impact descriptions mention flow data that MAY be available in time for the final draft. The lack of sufficient operational data causes some serious concerns. How can this be an adequate evaluation of alternatives if the operational data has not been modeled. The operations criteria, data, and modeling results will have a large impact on each CALFED project components. Operational impacts are a necessary component of this DEIR/DEIS. This DEIR/DEIS evaluation will not be complete until this component is properly evaluated and submitted for review.

Neither documents (Affected Environment and the DEIR/DEIS) provide much justification to support some rather significant changes (5 MAF more water diverted). Justification for this and other significant changes should be included in order to provide a thorough disclosure of the project.

Reservoir creation, enlargement, and operational changes will cause impacts to species and habitats. Impacts upstream of reservoirs has not yet been addressed. Depending on reservoir location these impacts may be significant and must be included in the final DEIR/DEIS for proper review and evaluation.

Several sections in the document state that changes in Delta outflow and inflow will be minimal relative to the No-Action Alternative. This needs to be discussed further. It doesn't seem rational that there would be minimal changes when additional storage will provide up to 2.5 MAF of additional water.

There are many general statements, such as "common beliefs" that "may change after information is analyzed and models are run", "the perception of benefit or impacts range from beneficial to detrimental". Another example would be, "...closer approximation of natural flow patterns...." These very general statements are inadequate for proper review; they should be clarified and supported with evidence.

The term "wild" salmon is used extensively throughout this document. The consensus opinion among many biologist and geneticists is that "natural" salmon is a better description of the salmon resources in the Central Valley.

Throughout this document there are vague statements that seek to placate concerns and hide the more likely impacts: "Under Alternative 2, reservoir and diversion facilities would be reoperated to provide flows that protect and enhance the ecological functions and processes affecting the Delta channels; open water areas; and associated marsh, riparian and floodplain areas "(Page 41, FLOW, paragraph 1). This sounds good, but it isn't specific about which functions and processes will be protected and enhanced, or more importantly **how** reservoirs and export operations will change. These generalities need to be addressed in detail. Moreover, the

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concept is intuitively improbable. Consider the following scenario. Rainfall and snow melt provide flow in the rivers during the winter and spring, and native species are adapted to this pattern of runoff. Flood control and water storage limit the flow in the winter and spring, then increase it during the summer and fall; opposite of the natural pattern. How can additional storage and reoperation protect and enhance? At best it will be neutral by shifting flows from a high outflow year to a low outflow year! Presently flows not stored or exported are 100% "environmental water" which no one can dispute. New storage and reoperation will simply change the species to benefit from the water. Any additional change in flow pattern will result in a net loss of environmental water or at least a change in timing. Saying that 33% of new storage will be devoted to environmental needs is saying we get a 33% rebate on the loss of this water to environmental needs, and even that generous a rebate presumes that we know how best to use the water.

The document states that "...instream flows may be provided that are more similar to seasonal flow patterns under natural conditions. More natural flow patterns are assumed to have beneficial impacts on the river ecosystems..." While this is probably true, mimicking natural flow conditions will not benefit natural steelhead populations in major tributaries and will cause severe impacts to these populations. Because of the placement of impassable dams on all major tributaries, approximately 95% of historical Central Valley steelhead habitat is inaccessible (Reynolds 1993; Yoshiyama et al. 1996) hence natural populations are mostly relegated to spawning and rearing in low elevation habitats that were historically used only as migration corridors. Because of increased summer and fall hypolimnetic releases from reservoirs, flow and temperature conditions in the late summer and fall periods in these reaches are more beneficial to steelhead than before the dams were built, and small numbers of natural steelhead are able to sustain themselves in these tailwater habitats because of this (at least in wet years when there is adequate reservoir storage). Inhospitable conditions in the lower reaches in the pre-dam years was not an overriding impact to steelhead because they had access to the cooler water habitats of the mid and high elevation tributaries. Mimicking of natural flows, and resultant minimal flows in the late-summer and fall period, without providing access to historical habitat, will most likely eliminate naturally spawning steelhead from the major tributaries.

This document needs to address the fact that the Central Valley drainages are no longer suitable for steelhead, because of the loss of nearly all of their historical spawning and rearing habitat. Consequently, there are only two alternatives that have the potential to adequately restore Central Valley steelhead: 1) provide passage around the major barriers so that steelhead have access to and from a significant portion of their historical spawning and rearing habitats in the major tributaries, or 2) provide releases below major reservoirs (which necessitates adequate storage) to maintain suitable water temperatures year-round in tailwater habitats. Without this, all other CALFED proposed actions will not substantially increase steelhead populations.

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Delete the word "Sacramento" from "Sacramento splittail".

Specific Comments

Page 1, Paragraph 1, Sentence 1

The phrase, "in Northern California" is not necessary.

Page 1, Paragraph 3, Sentence 2

"Water supply reliability" should be replaced with "water use efficiency".

Page 2, Paragraph 3, Bullet 2

Include "and adjacent tidal sloughs and channels" at end of sentence.

Page 2, Paragraph 4, Bullet 3

Rephrasing or deleting this sentence would enhance the meaning of the paragraph.

Page 4, Table 1, Title

Include the following in the title, "Description of Streams and Rivers Included in the Impact..."

Page 4, Table 1, Table Headers

Change title to, "Streams & Rivers".

Page 4, Table 1, Sacramento River Region, Description, Paragraph 3

Change "Creeks" to "creeks".

Page 5, Table 2

The re-operation of reservoirs in the San Joaquin should be listed due to their significant affects on flows and water temperatures below the major reservoirs. It is the integration

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of the two that operationally will need changing on the Merced and Stanislaus river.

Page 5, Table 2, Title

Delete the word "Downstream".

Page 5, Sacramento River Region, Whiskeytown Lake

Reconsider if Clear Creek is really a water source.

Page 6, Summary, Paragraph 1, Sentence 3

Add an "s" at the end of "change".

Page 6, Summary, Paragraph 2, Sentence 2

Add a period at the end of "occur". Remove the phrase "but the potential impact" and replace with "They".

Table 3, Column 2D, Row 3 & 5

"Additional habitat restoration" and "habitat loss" contradict each other in column 2D since the habitat types are not clarified. Please indicate what habitat types are being discussed.

Table 3, Reduced Sacramento River flow

Clarify where the flow reductions on the Sacramento River occur.

Page 8, Paragraph 5, Sentence 1

Are these beneficial impacts part of the ERPP common program? If so, the benefits of the common programs should be addressed separately. As written, it is implied that the alternatives are responsible for these benefits.

Page 8, Paragraph 6, Sentence 2

This is a very vague statement. The beneficial impact affecting "...the movement of Delta species,..." should be clarified.

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Page 8, Paragraph 7, Sentence 3

Clarify what a "closer approximation of natural flow patterns" really means. One cfs more is a closer approximation but it is doubtful beneficial impacts would be measurable.

Page 8, Paragraph 7, Sentence 4

Include the phrase, "improved rearing conditions," after "flow toward Suisun Bay".

Page 8, Paragraph 8, Sentence 1

Change "have" to "has".

Page 9, Paragraph 1, Sentence 1

This statement should include the habitat types that will be removed. Rock riprapped levee banks are of a lesser value than natural levees with vegetation. The banks that will be impacted should be briefly described.

Page 9, Paragraph 3, Sentence 1

Losses at unscreened diversions are due to several factors, not just predation. Entrainment itself is a form of loss. Fish drawn through unscreened diversions end up in unsuitable habitats or areas that will be drained. These losses should be evaluated in addition to predation.

Page 10, Paragraph 2, Sentence 1

Additional aquatic restoration under alternatives 2 and 3 would provide some beneficial impacts; however, not all impacts described above (e.g., increased organic carbon and production) would apply.

Page 10, Paragraph 6, Sentence 1

Reduce outflows could cause potential adverse impacts during certain months and year types.

Page 11, Paragraph 4, Sentence 1

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ERPP provides benefits to all alternatives. Consider discussing ERPP in the summary on page 6.

Page 11, Paragraph 5

A discussion about changes in flows and flow patterns associated with the new reservoirs or reservoir reoperations would be an essential part of the discussion on adverse impacts.

Page 11, Paragraph 5, Sentence 1

The summary indicated No Adverse Impacts in any of the Regions or Service Areas, yet the document lists many adverse impacts under most alternatives. It appears that 1.6 million acre-feet of water "may be made available" for instream uses but it isn't clear if that is over and above existing supplies (including CVPIA b2, water transfers, any changes in appropriative rights over time, etc.). Clarification is important here.

Page 11, Paragraph 6

The possibility for growth inducing impacts on aquatic resources is not mention.

Page 14, Paragraph 1, Sentence 1

"Approximate" can have different meanings to different people. CALFED needs to define "approximate" as it relates to restored habitats.

Page 14, Ecosystem-level Analysis

This section is missing key biological indicators of ecosystem health. There is no focus on the biological health of the ecosystem. Instead there are general relationships assumed between flow, water temperature, sediment supply, contaminant input, etc. and only lists of general indicators of beneficial impacts. The implication seems to be that a little more flow, a little better temperature, a little better sediment load, a little better etc., thus the ecosystem is restored and the fisheries are restored and water system has been further developed. Describe the assurances that biological functions will be restored when the focus is on physical features and clarify the relationship between physical features and biological functions.

Genetic maintenance in the ecosystem is not discussed.

Page 15, Paragraph 2, Sentence 3

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This assumption is flawed because small net flows won't do much. If "significant" is inserted after "providing" and before "net flow" the assumption may be more accurate.

Page 15, Paragraph 2, Sentence 6

Delta hydraulics is used throughout the ERPP and should be included in this discussion for consistency.

Page 15, Paragraph 5, Bullet 3

Add "and amount" after "net flow direction".

Page 16, Paragraph 1

The paragraph ascribes benefits where none may occur, or where benefits are inconsequential as "increase in reservoir storage and increased length of restored riparian shaded riverine habitat."

Page 16, Paragraph 2

Width is also a component if you wish to reestablish cooling processes.

Page 16, Paragraph 3

Sediment supply and movement should be defined in appendix A.

Page 16, Paragraph 4, Sentence 3

State which reference document supports the idea that added sediments have limited ecosystem benefits; this statement implicates we should not supplement gravel.

Page 17, Paragraph 2

Treatment of discharges by restoring natural marshes and wetlands may be asking for another Kesterson.

Page 17, Paragraph 2, Sentence 2

Although sediments can be considered a contaminant for some conditions, it may be possible the meaning of "sediments" in this passage could be confused with the previous section.

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Page 17, Paragraph 5

Productivity and nutrient input and movement should be discussed in appendix A.

Page 17, Paragraph 5, Bullet 1

Elaborate on the beneficial impacts of fish screens on "productivity".

Page 18, Productivity and Nutrient Input and Movement bullets

Add a bullet, "restoration of net flow patterns (see "flow").

Page 18, Paragraph 3, Sentence 1

Does flooding islands really approximate conditions before levees were constructed? Where were there 15-foot deep lakes in the delta prior to the time levees were built? It is just as likely that existing channels with well-developed riparian and emergent vegetation better mimic previous conditions for fishes.

Page 19, Paragraph 4, Sentence 1

Add an "a" after the second word; so the sentence reads, "In selecting a representative species,..."

Page 20, Table 4, Fish, Common Name

Change "Sacramento Splittail" to "Splittail".

Page 20, Table 4, Region, Delta

Consider putting an "X" for Sacramento squawfish and Starry flounder under the "Delta" column, these changes are to be consist with the text and know occurrence.

Page 20, Table 4, Region, Bay

Consider putting an "X" for Splittail, Delta smelt, and native mysid shrimp under the "Bay" column, these changes are to be consist with the text and know occurrence.

Page 21, Paragraph 1, Bullet 3

How does one know that an indicator has "fair and consistent applicability to all

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alternatives when extended beyond current and historical conditions?" You can identify indicators that obviously do not meet this criterion, but others may not also, as you only have current and historical conditions upon which to base a judgement.

Page 21, Paragraph 2, Sentence 1

The definition of "entrainment" may be a good addition to Appendix A.

Page 21, Paragraph 4, Sentence 2

Don't forget the most important "specific resource" needed by the aquatic community is water.

Page 22, Paragraph 5, Bullet 3

"... relocation ... to Suisun Bay" means giving up on the delta as suitable habitat. The populations of delta smelt and striped bass may have problems being restored if half their nursery habitat is forfeited.

Page 24, Movement Relationships

A barrier at the Head of Old River changes natural flow patterns, since the natural flow pattern takes San Joaquin River water down Old River through the south and central delta and back to the lower San Joaquin River. Construction of an operable barrier on the Head of Old River at Mossdale would not provide beneficial impacts on movement. The second to the last paragraph states a more positive flow down the San Joaquin River to the Port of Stockton to "improve Movement Relationships" but fails to acknowledge proposed increases in net negative flow just past the short reach where slightly more positive flows may occur. Barrier operations also need to be addressed so that their affect can be properly evaluated.

Page 24, Paragraph 4, Sentence 1

Migration cues for juvenile chinook salmon (and steelhead?) are pretty well understood. What is not understood is how little water can we put down the stream and still get juveniles to move out.

Page 24, Paragraph 4, Sentence 3

Add "move juvenile fish into suitable rearing areas and" after "assumed to" and before "provide".

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Page 24, Paragraph 5, Sentence 1

Change sentence to read, "Flow directions and patterns that more closely approximate natural..."

Page 25, Paragraph 2, Sentence 1

Add "support suitable rearing and to" after "assumed to" and before "facilitate".

Page 25, Paragraph 3

The picture presented is incomplete. Under low San Joaquin River flows, water entering the central Delta from Three Mile Slough and the lower San Joaquin River can be significant, impacts to fish can be too.

Page 25, Paragraph 5, Sentence 5

At the end of the sentence add, "to provide benefits to San Joaquin fall run while avoiding adverse impacts to other fish in the central and south Delta".

Page 26, Paragraph 6, Sentence 1

Legal harvest of striped bass has not been identified as a factor affecting natural production in our population. The magnitude of illegal harvest is unknown, but it may affect the population.

Page 27, Paragraph 2

The Department does not believe this provides a complete and accurate assessment of significance for the Bay Delta with regards to CEQA. Since the Department is part of CALFED, they should agree with significance criteria. As written, we can not agree. The vegetation and wildlife technical report does a better job, and with some modification, could apply to this technical report as well. This section needs to realize that significance has to be defined in the context of issues such as:

- a) The Delta is a critical area and has been severely degraded. New adverse impacts can not be tolerated.
- b) The project is the restoration of the Delta and unmitigated adverse impacts could be inconsistent with the project purpose.

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Page 28, Paragraph 4, Sentence 2

The statement, "Delta inflow and outflow would most likely be similar to flows under existing conditions," does not seem to be supportable.

Page 28, Paragraph 4, Sentence 3

Operations rules allow significant changes from existing conditions; in addition, demands on the system could increase.

Page 31, Paragraph 3, Sentence 5

The structural changes will not increase spawning habitat for striped bass.

Page 31, Paragraph 4, Sentence 1

This sentence should be rewritten to emphasize that nutrient, contaminates, and primary production in the by are primarily responsible for effects on fishery and aquatic resources.

Page 31, Paragraph 5

The mention of CVPIA would benefit this paragraphs content.

Page 32, Paragraph 2, Sentence 2

Isn't the Shasta temperature control structure already in place? It is our understanding that this structure has primarily offset power production losses from management actions to reduce water temperatures that were already being taken. Clarify how the Shasta temperature control structure will improve water temperature conditions in the Sacramento River.

Page 32, Paragraph 3, Sentence 2

Merced River flows will also be altered under the no action Alternative, contrary to the assumption of the document. In order to divert more water and implement a groundwater recharge or additional surface storage the water rights must change. The instream allocations to protect public trust resources is so low that there is a question that we and others would pursue and very likely obtain necessary changes to instream allocations as a condition of further diversions for other uses. Groundwater management actions are proceeding outside of CALFED, thus instream flows are likely to increase.

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under the No Action Alternative. How will CALFED "count" those increases in their 1.6 MAF "commitment" to the resources (33% of 5 MAF)?

This section also assumes the retirement of 45,000 acres of agricultural lands will increase water supplies for other uses. It seems that with the agricultural water requirements, and groundwater banks that the benefits derived from land retirement will not be seen.

Page 32, Paragraph 6, Sentence 3

Change "may" to "will".

Page 33, Paragraph 3, Sentence 2

Because there is a fundamental error in assuming little difference between No-Action and existing conditions, this description doesn't adequately describe the relative difference of the various versions of Alternative 1 or the other alternatives. Therefore, it is more probable that Alternative 1A may change very little compared to the No-Action for diversions and reservoir operations. Alternative 1B may also represent little change compared to the No-Action.

Page 33, Paragraph 5, Sentence 2

"Under the ecosystem approach, CALFED actions are considered beneficial if structural and unconditional characteristics of the aquatic system approximate a restored system." This "ecosystem level" analysis proposed needs to address both biological and physical functions. One without the other is not ecosystem management or restoration. For example, Page 35, Paragraph 6, Sentence 6, state that, "The adverse impact would be minimal, however, because net flow direction in the connecting channels (Old and Middle rivers north of the export facilities) would continue to be toward the south and counter the natural flow direction." This conclusion is based on the assumption that "barrier would be constructed to alter the flow patterns" presumably in a positive manner, more natural-like. But, from the perspective of the biological function of fish in the area this may not be a positive change.

Page 35, Paragraph 1

The ability of Alternative 1 (especially 1A & 1B) to provide flows to protect and enhance functions and processes is extremely limited. Net flow patterns will likely be adverse.

Page 35, Paragraph 2

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This is an example of the impossibility of evaluating impacts without operation studies. The writer is essentially saying you cannot know what will happen. Why bother to write an impact assessment, even at the "programmatic level," when future conditions under the alternatives cannot be specified? The writer has been given an impossible task.

Page 35, Paragraph 2

A simple example of how both types of impacts could occur should be provide. After reviewing ISDP, alternative 1B will likely not result in any reasonable net improvement on average, instead, it is likely to degrade flows.

Page 35, Paragraph 3

A qualitative discussion on how the intertie works or could provide benefits or be detrimental would be appropriate in this section.

Page 35, Paragraph 6, Sentence 6

The sentence does not make sense. Please provide supporting evidence and explanation to support your view point that the adverse impacts are minimal because export flows would counter the natural flow direction.

Page 35, Paragraph 6, Sentence 6

This sentence is confusing. When barriers are in, natural flow direction is hampered in all channels.

Page 38, Paragraph 2

Consideration should be given to using the ERPP designations and areas for units within the Delta.

Page 38, Paragraph 4, Sentence 3

Shallow-water habitat is not likely to substantially benefit white sturgeon juveniles, as they generally are most abundant in deep water.

Page 39, Paragraph 3

It is fair to mention that screening the south Delta diversions with new fish screens in

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variations 1B and 1C still present problems with by-pass flows, fish handling, mortality, predation, and other issues.

Page 39, Paragraph 4

This concept needs to be better defined so this technical report can explain potential benefits or detriments. The intertie, for instance, is just as likely to increase mortality of fish.

Page 39, Paragraph 5, Sentence 1

This has more circular logic about the benefits of the Head of Old River Barrier (HORB). Perhaps, CALFED should look at eliminating the barriers altogether if the SWP and CVP facilities are to be screened and flows are to improve. CALFED should also explore alternative water supply approaches for South Delta Water Agency. What happens to sediment movement in the channels with barriers and who pays for the removal of the sediment build up?

Page 39, Paragraph 5, Sentence 6

Add "while avoiding significant adverse impacts on" after "San Joaquin River" and remove the word "and" from in front of "other Delta species".

Page 40, Paragraph 4, Sentence 1

This paragraph gets at the age-old indirect loss issue in the South Delta. Drafting of fish and nutrients into the South Delta where residence time may increase is a problem that is bad now and may get worse. This is clearly a cumulative impact issue that needs to be evaluated and discussed.

Page 41, Paragraph 1

References need to be included in the Artificial Production section. CALFED should recognize that much of the negative hatchery information is associated with programs outside of California. CALFED should avoid generalized statements.

Page 41, Paragraph 6, Sentence 3

Under 2A and 2C, free SWP physical pump capacity is not likely to provide net benefits to flow. Instead, based on a review of ISDP, there will likely be a net detrimental effect

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on flows and hydraulics in the Delta.

Page 42, Paragraph 5, Sentence 2

This should be clarified so reader understands that the HORB is part of these form variations but the other south Delta barriers are only part of 2A and 2B.

Page 42, Paragraph 5, Sentence 3

The description of the HORB is different than what is evolving under the Temporary Barriers Program (Whose purpose is to evaluate the effectiveness of barriers in the Interim South Delta Program). If the direction of connecting channels will remain (reversed flow) how will there be any benefit to fish at the population level? This shows how important it is to evaluate both the physical features and the biological implications when determining impacts.

Page 42, Paragraph 5, Sentence 6

Clarify in the same way as in Alternative 1 analysis.

Page 42, Paragraph 6

Mention impact on Snodgrass Slough "natural area".

Page 43, Paragraph 7, Sentence 4

The extent to which variation 2A and 2B can accomplish this should be described.

Page 45, Paragraph 1, Sentence 1

"...good-quality...habitat..." should be more adequately described as "unique, high-quality habitats". In addition, habitat that is being "eliminated or modified" is probably being destroyed.

Page 45, Paragraph 1, Sentence 4

Adverse impacts will affect both fish and wildlife species.

Page 45, Paragraph 4

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The possibility of no willing sellers would mean the possibility of no increased out flow.
This would result in no beneficial impacts.

Page 45, Paragraph 5, Sentence 2

Change "affect" to "effect".

Page 45, Paragraph 6, Sentence 1

Salinity is expected to be reduced as the percentage of water entering the north and central Delta is increased with most alternative 2 variations.

Page 46, Paragraph 1 and 2

Is it feasible to build unscreened diversions of this magnitude (Alternative 2C)?

Page 46, Paragraph 1, Sentence 2

The text should clarify when diversions would be closed to reduce entrainment during peak fish abundance periods.

Page 46, Paragraph 3

Need to include white and green sturgeon in the discussion of losses to diversions in the Sacramento River.

Page 46, Paragraph 4, Sentence 3

Why is there discussion of an isolated facility in alternative 2?

Page 46, Paragraph 6, Sentence 1

Comments made on entrainment and screening associated with alternative 1 apply here as well.

Page 47, Paragraph 1 and 2

These paragraphs fail to focus on the ecosystem-level impacts on the South Delta. Simply improving the flow in the short section of the San Joaquin River between the Head of Old River and the Stockton Turning Basin does not address the cumulative

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impacts to the ecosystem or the population level impacts to species present in that ecosystem.

Page 48, Paragraph 7, Sentence 2

Impacts are likely to be even higher than in CCF.

Page 49, Alternative 3, Paragraph 3

The Department specifically requested that either an additional variation of Alternative 3 be evaluated or key components be evaluated in the Programmatic DEIR/DEIS. The current July 1, 1997 is, in our view, totally flawed because it includes neither evaluation. For example, the Department alternative does not include new SWP fish screens, it uses a different intertie approach, has a 10,000 isolated conveyance, proposes approximately 2,000 cfs outflow into the Mokelumne River, has no new enlarged intake to Clifton Court Forebay, includes a new small intake from Italian Slough, and deletes other direct connection to south Delta (leave existing radial gates as emergency facility).

Page 49, Paragraph 5

There are two problems with Alternative 3. First, Alternative 3 reduces flows in the Sacramento River below IF intake. Second, there will be less Delta out flow in dry years due to the decreased need for "carriage water".

Page 49, Paragraph 5, Sentence 3

It is questionable if this is an accurate assumption. Reevaluate if there are effects on aquatic resources, water quality, movement, etc. associated with the deep water ship channel. Are entrapment of larval delta smelt reduced with the proposed intake in west Sacramento?

Page 49, Paragraph 3 (Flow)

The discussion of flows, particularly net flows (or Delta hydraulics) is so vague in this section that it represents a fatal flaw. Even without model data, the qualitative discussion should be improved and made substantially clearer.

Page 50, Paragraph 4, Sentence 6

See previous comments regarding south Delta barriers in other alternatives.

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Page 51, Paragraph 2, Sentence 2

List and describe adverse impacts.

Page 52, Paragraph 1, Sentence 1

Clarify the meaning of "entrainment of productivity" and "re-operation of diversions to avoid season peaks in productivity."

Page 53, Paragraph 3

If there are no willing sellers who control a significant amount of water, there will be minimal or no benefits; therefore it may be unreasonable to assume that these environmental flows will be available.

Page 54, Paragraph 2

The benefits are more certain than "may". This paragraph also discusses levels of mortality associated with screens and intake facilities. These same concerns need to be stated to the appropriate variations of alternatives 1 and 2. Also it should be noted that the north and central Delta may be more hospitable and these diversions into Georgiana Slough may not be adverse.

Page 54, Paragraph 4, Sentence 3

Change "may be reduced" to "will be reduced". Also, a commitment to reduce diversions during peak egg and larva occurrence and maintain aquatic downstream transport flows should be specified as part of Alternative 3.

Page 55, Paragraph 2

See comments on other alternatives, they apply here as well.

Page 55, Paragraph 4, Sentence 6

Add "while avoiding impacts on" after "San Joaquin River" and before "other Delta species".

Page 56, Paragraph 5

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It should be noted that the north and central Delta may be more hospitable and these diversions into Georgiana Slough may not be adverse.

Page 57, Paragraph 3

Impacts are likely to be even higher than with Clifton Court Forebay.

Page 67, Paragraph 2

This paragraph should discuss growth inducing impacts in the service areas.

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General Comments

Much information in this report is not up to date.

The sections on steelhead life-history and population trends is deficient because authoritative references such as Hallock et. al (1961) *An evaluation of stocking hatchery-reared steelhead rainbow trout in the Sacramento River system* (which is the authoritative reference on life-history of Sacramento River steelhead) or the Department's Fish and Wildlife Plan of 1965 (which is an excellent historical reference for steelhead) were not consulted or referenced. Also, the Department's *Steelhead Restoration and Management Plan for California* (1996) (Steelhead Plan), which contains the most thorough and up-to-date summary of the available literature and status of Central Valley steelhead, was not used. Instead, the section relies heavily on Reynolds et al. (1990) for information, which contains some outdated and erroneous information. For this section to be complete and up-to-date, the writers need to review and cite the above-mentioned references.

Information on steelhead populations in the San Joaquin River system is lacking in this document. Historical documentation exists that show that steelhead were widespread throughout the San Joaquin River system, and there is substantial documentation that remnant steelhead populations are extant in some tributaries in this system. Refer to the following references:

- Yoshiyama et al. (1996), Latta (1949), and Preston (1981) provide an interesting documentation of historical steelhead populations in the San Joaquin system. These

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documents contain statements from local Native Americans that large, sea-running rainbow trout were present and taken from the Kings River and Tulare Lake.

- On the Tuolumne River, a total of 66 steelhead were counted at Dennet Dam between October 1 and November 30, 1940. A total of five steelhead was counted in late October of 1942 (CDFG 1993).

Known chinook salmon distribution in the San Joaquin system provides further indication of the extent of steelhead distribution. In the Klamath River drainage, for instance, all streams that contain a chinook salmon population have steelhead as well and, in nearly all cases, steelhead go higher into the drainage and utilize more of the stream system than do chinook salmon. This indicates that if chinook salmon were able to access and utilize habitat of a particular stream, steelhead could as well.

Recent documentation of juvenile rainbow trout exhibiting smolt characteristics from several biological surveys, angler information, and observations at Merced River Hatchery provide substantial evidence that a remnant steelhead population continues to persist in this system:

- Numerous juvenile steelhead exhibiting smolt characteristics have been captured during an annual chinook salmon Kodiak trawl survey at Mossdale on the lower San Joaquin River from 1987 to the present (CDFG data).
- On the Stanislaus River, a small, but viable, naturally-spawning steelhead population exists below Goodwin Dam, the upstream terminus of the anadromous reach in this stream. Department fishery biologists have documented successful reproduction (juvenile out-migrants) since 1988. Anglers in the Oakdale area report occasional steelhead from 2 to 10 pounds and creel census information obtained by the Department documents the catch of rainbow trout greater than 20 inches (CDFG nd). Examination of limited scale samples from these larger trout by Department biologists show an accelerated growth period typical of estuary or ocean residence. Rotary screw trap catches by biological consultants (S.P. Cramer and Assoc. 1997) of smolting juvenile steelhead in the spring and early summer months of 1993 through 1997 provide additional evidence of run viability. Additionally, an illegally harvested 28-inch steelhead was confiscated by Fish and Game Wardens in 1995.

On the Merced River, a few ripe adult steelhead enter the trap at the Merced River Fish Hatchery every year. Scales are currently on file at the hatchery, and personal communications from local fishing groups attest to the viability of the small run. A rainbow trout fishery exists on the Merced River as well.

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Specific Comments

Page 5, Paragraph 3, Sentence 2

SWP and CVP divert more than 60% of the freshwater inflow. The inclusion of Delta agricultural result in a much greater total percent diverted. Agricultural diversions should be addressed in this section.

Page 6, Paragraph 1, Sentence 2

The fractional amounts of exiting biomass do not seem consistent with the percentage of algae diverted which is mentioned on page 5, paragraph 5.

Page 12, Paragraph 2, Sentence 5

It is more correct to state that "Majority of spawning takes place between late December and March".

Page 12, Paragraph 5, Sentence 1

The statement that most juveniles emigrate downstream after 1 year of stream residence is incorrect. Most Sacramento River naturally-spawned steelhead rear in freshwater for two years before emigrating (Hallock et al. 1961).

Page 13, Paragraph 1, Sentence 2

The estimated average natural run size of 15,055 fish for the Sacramento River system from 1967 to 1971 is incorrect. This number is accurate, but it is the Total steelhead run size, as counted at Red Bluff Diversion Dam (RBDD), hence is composed of both natural and Coleman National Fish Hatchery steelhead adults migrating into the upper Sacramento River system only. This estimate does not include natural adults migrating into downstream tributaries that support natural steelhead production, such as the Feather, Yuba, and American rivers and Antelope, Mill, Deer, Butte and Chico creeks (see Table 5, page 48 of Steelhead Plan for correct and current estimates based on RBDD counts). The lower estimate, 1,714, is also incorrect. The correct estimate is 850, and this is for the five-year period 1989 to 1993, not for "the last 5 years" as stated (1993 was the last year counts could be made at RBDD because of implementation of measures to facilitate winter-run chinook salmon passage).

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Page 13, Paragraph 2, Sentence 1

The Fish and Wildlife Plan of 1965 estimates spawning escapements in the Feather, Yuba, and American rivers estimates to be 2,500, 500, and 2,500, respectively.

Page 13, Paragraph 2, Sentence 6

The statement "Steelhead in the Feather River are maintained from Feather River Fish Hatchery" is not cited. I know of no studies that have been undertaken that provides a basis for this statement. The reference needs to be cited or the statement deleted.

Page 13, Paragraph 3, Sentence 4

The last sentence needs to be cited (Staley 1976?).

Page 13, Paragraph 4

Include a brief paragraph near the end of the "steelhead population trends" section acknowledging steelhead remnant population existence in the San Joaquin basin. DFG's recent letter to NMFS regarding steelhead candidacy under FESA provides guidance.

Page 14, Paragraph 2, Sentence 1

It is pleasing to see in this document the statement about flow being a major factor limiting steelhead. Most anadromous fish plans for the Central Valley (e.g. the CVPIA programmatic EIS) have utterly failed to recognize this simple life history characteristic of steelhead (and how it differs from chinook salmon) and this has resulted in the ubiquitous misconception that measures to restore fall-run chinook salmon (which do not rear in fresh water for an entire year) will restore steelhead as well. This has resulted in a lack of effort to provide adequate habitat conditions for steelhead, and has been a major reason for their decline. This same statement holds true for water temperatures as well (adequate temperatures must be provided year-round).

Page 14, Paragraph 3, Sentence 1

Barriers are limiting steelhead to rearing in habitats that are marginal. Barriers at low elevations on all major tributaries have blocked access to an estimated 95% of historical spawning habitat in the Central Valley (Reynolds et al. 1993; Yoshiyame et al. 1996), consequently, steelhead are relegated to spawning and rearing in reaches that were formally used only as migration corridors.

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Page 14, Paragraph 5, Sentence 2

This sentence seems to indicate that steelhead spawned naturally in the main stem Sacramento River before dams were constructed. There is some spawning that takes place in the upper Sacramento River above RBDD, but steelhead are, for the most part, mid- to high elevation tributary spawners, hence would have spawned predominantly in the tributaries under natural habitat conditions.

Page 15, Paragraph 4

The migration pattern described here is incorrect and has changed with time. CALFED should review Orsi 1971 (CFG 57(4):257-267) and talk with Ken Miller (DFG, Bay-Delta). Males mature at age 2-4, females at ages ≥ 5 .

Page 15, Paragraph 4, Sentence 4

Since late 70s or 80s, more striped bass are being caught in the Delta and fewer in San Francisco Bay than in the 60s or early 70s, but most adult striped bass are not in the Delta and Suisun Bay in summer/fall.

Page 15, Paragraph 5, Sentence 1

Most female striped bass are not mature until their fifth year, but the males can become mature as early as their second year; and they can live for more than 20 years.

Page 15, Paragraph 5, Sentence 2

The majority of the striped bass in the Delta are between 0 and 1 year old.

Page 15, Paragraph 5, Sentence 4

Remove "lower" from in front of "San Joaquin River".

Page 15, Paragraph 6, Sentence 1

Add "sometimes" after "and" and before "occurs".

Page 16, Paragraph 3

The population declined to 1.7 million in the early 1970s. The record low was 604,000

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in 1993. Hatchery contribution reached 26% in 1993.

Page 16, Paragraph 3, Sentence 1

Add "and early 1970, 1.1 million by 1980, and 600,000-800,000 during the 1990s" to the end of the sentence.

Page 16, Paragraph 3, Sentence 2

Delete this sentence.

Page 16, Paragraph 3, Sentence 5

Change the sentence to read, "The hatchery contribution to the total adult striped bass population increased from less than 1% in 1984 to 26% in 1993.

Page 16, Paragraph 3, Sentence 6

Add "yearling" after "of" and before "hatchery". Also, the paragraph would be enhanced with the addition of the following, "Stocking was reduced in 1991 and in 1994, only 9% of the population was "hatchery fish"."

Page 16, Paragraph 4, Sentence 1

Change "20-year decline" to "30-year decline".

Page 16, Paragraph 4, Sentence 2

The information reported by Turner and Chadwick, 1972, is out of date.

Page 16, Paragraph 4, Sentence 2

Use the more current information from Stevens et al. 1985 and DFG 1992 (exhibits 2 & 3) instead of Turner and Chadwick, 1972.

Page 16, Paragraph 4, Sentence 3

At the end of sentence, add ",but it is clear that the decline of the striped bass population is closely associated with increased water development, particularly increased exports of water and entrainment of young fish from the Delta."

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This section is out of date and should be revised.

Page 17, Paragraph 3

Discuss the magnitude of CVP and SWP pumping.

Page 17, Paragraph 4, Sentence 1

Add "are initially abundant and" between "that" and "experience".

Page 17, Paragraph 4, Sentence 7

Change "may be" to "are". At end of sentence, add "and water export rates." Cite percent reduction estimates from IEP Technical Report number 25 and DFG Exhibit 2 in 1992 SWRCB hearings.

Page 17, Paragraph 5, Sentence 1

This statement does not apply to the Sacramento River.

Page 17, Paragraph 5, Sentence 2

Remove "upstream" from behind "spawned" and in front of "in the Delta".

Page 17, Paragraph 6, Sentence 2

After the semicolon, write "however, most diking and filling in the estuary long preceded the precipitous 30-year decline in the population."

Page 17, Paragraph 6, Sentence 4

Delete "adult" from in front of "striped bass" and include "may" after "and" and before "increase".

Page 18, Paragraph 1, Sentence 2 & 3

More stringent fishing regulations would have minimal effect on adult mortality; if angling mortality was halved, this would only reduce adult mortality by 5-7%.

Page 18, Paragraph 2

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Prey densities have always been lower in the delta than appears necessary for optimal striped bass growth. Thus, bass in the delta have always been food limited.

Page 18, Paragraph 2, Sentence 2

Include "*Pseudodiaptomus* and" in front of "*Sinocalanus*". Remove "an" from in front of "introduced".

Page 18, Paragraph 2, Sentence 3

Delete "another introduced copepod found" and replace with "which is".

Page 18, Paragraph 4

Update this to describe present stocking of net-pen-reared fish and DFG efforts to expand stocking of artificially reared bass.

Page 18, Paragraph 4, Sentence 2

At end of sentence add, ", but recent practice has been to stock yearlings in San Pablo Bay downstream from the primary nursery area of naturally produced fish."

Page 18, Paragraph 4, Sentence 4

Information is not current. 113,000 juvenile striped bass are being released in 1997.

Page 18, Paragraph 5, Sentence 3

Die off has been substantially less in recent years.

Page 18, Paragraph 5, Sentence 3 & 6

Recent summer die-offs have decreased in magnitude, but maybe only because overall abundance has decreased. Subsequent analyses have not found good associations between egg resorption or abnormalities and contaminants in prespawning females. Revise the section on rice herbicides in light of errors in Howard Bailey's analysis and reduced loading in the Sacramento River in recent years.

Page 19, Paragraph 1, Sentence 3-5

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This has been pretty much disproven.

Page 19, Paragraph 4, Sentence 2

Tributaries may be included in your 29,000 adults figure. Information about total run size would be more informative.

Page 19, Paragraph 5, Sentence 1

The Fall-run population trends are understated. Consider changing the paragraph to read "In the San Joaquin River system.... salmon have been seriously reduced with sequential water developments in the tributaries and the Delta since the 1940's. Populations remain below major dams on the Merced, Tuolumne and Stanislaus rivers and generally increase to near optimum production levels in response to infrequent runoff conditions that exceed storage capacity and approximate natural unimpaired conditions."

Page 20, Paragraph 3, Sentence 1

Exchange the words "an estimated" with "only".

Page 20, Paragraph 4, Sentence 2

It is questionable that over harvesting was one of the major causings of declines in the population.

Page 23, Paragraph 2, Sentence 1

These values seem low; perhaps the citations should be checked.

Page 23, Paragraph 2, Sentence 2

There were near record landings in 1995.

Page 23, Paragraph 2 (Harvest), Sentence 3 & 4

A 1.8% average catch is not concerned a significant factor. Clarify CALFED's definition of "significant".

Page 24, Paragraph 5, Sentence 2

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The 70-80% figure indicates how important hatchery fish are. Instead of the general tone of this section implying that hatchery fish are detrimental, it should recognize their importance to a large segment of the public. Management options are available to protect wild stocks, such as tagging and fin clipping all hatchery fish and restricting harvest to fin-clipped fish.

Page 24, Paragraph 5, Sentence 3

Delete "on" before "directly from the hatchery".

Page 25, Paragraph 1, Sentence 1

Young green sturgeons have been captured near Red Bluff; therefore, green sturgeons have obviously been spawning there. It is advisable that you remove "lower" from the sentence.

Page 25, Paragraph 2

Spawning takes place from Feb to May, but upstream migration starts as early as November.

Page 25, Paragraph 3

Mention that larvae are found in the delta and Suisun Bay when Sacramento River flows are high. Thus, in high flow years many fish must rear in downstream areas.

Page 25, Paragraph 5, Sentence 3

Restate this to say that introduced Asian clams are commonly found in sturgeon stomachs.

Page 26, Paragraph 1, Sentence 1

Delete Brennan and Cailliet 1991 as a reference for population trends. The most up-to-date estimate is 26,000 fish over 102 cm in 1994.

Page 26, Paragraph 1, Sentence 5

Have the sentence read, "Population estimates reached a ..."

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Page 26, Paragraph 3

This section should also deal with diversion and entrainment of larvae and juveniles.
Data is available on screening efficiency for post-larval white sturgeon.

Page 26, Paragraph 5

Temperatures above 17C (63F) may be detrimental to sturgeon egg survival (Serge Doroshov).

Page 27, Paragraph 2, Sentence 1

Reword the sentence to say that harvest rates "increased substantially in the 1980s as the result of... "

Page 27, Paragraph 2, Sentence 2

Replace the sentence with the following, "New size limits in 1990 reduced harvest rate dramatically."

Page 27, Paragraph 2, Sentence 2

The statement "increased by 40%" doesn't provide an understanding of the magnitude of harvest, therefore, an inclusion of information stating "from ____ to ____ %" would be recommended.

Page 27, Paragraph 5, Sentence 2

Is this what is really meant? Painter probably found that the migration period was about three months long, but individual fish probably don't take that long.

Page 27, Paragraph 6, Sentence 5

State your source for egg survival reduction.

Page 29, Paragraph 7, Sentence 1

State known effects.

Page 30, Paragraph 1, Sentence 2

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The typical shad angler practices catch and release to a large extent; if other information states differently, please list source of information.

Page 30, Paragraph 2, Sentence 2

Change sentence as follows, "Losses of young shad especially in the Delta could be most effectively minimized by reducing diversions and exports from July through November."

Page 31, Paragraph 3, Sentence 1

This statement has not been supported by more recent information. Migration seems more tied to season than flows.

Page 31, Paragraph 3, Sentence 4

State direct evidence of this statement and include sources.

Page 31, Paragraph 3, Sentence 6

The statement, "also spawn in slightly brackish water in or above the entrapment zone", is not known information. The occurrence of larvae doesn't necessarily indicate spawning occurred there. Perhaps the reference should be reread to ensure a correct interpretation.

Page 31, Paragraph 3, Sentence 8

The interpretation of the source information may need review. The statement, "Delta smelt spawn in currents at night," is not a well known fact. Perhaps the reference should be reread to ensure a correct interpretation.

Page 31, Paragraph 3, Sentence 10

The interpretation of the source information may need review. It is questionable that ripe females have been collected as early as December.

Page 31, Paragraph 4, Sentence 2

Again more recent information did not substantiate this pattern.

Page 32, Paragraph 3, Sentence 5

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Again more recent information did not substantiate this pattern.

Page 34, Paragraph 4

Please read the important information contained in: Swanson C. and J.J. Cech, Jr. 1995. Environmental Tolerances and Requirements of the Delta Smelt, *Hypomesus transpacificus*. Prepared for the Dept. Of Water Resources contracts B-59449 and B-5859. This information may change the scope of your discussion.

Page 35, Paragraph 2

Please add the following, "Longfin smelt are regularly found in the Gulf of the Farallones during the fall and following high outflows (Baxter, pers comm)."

Page 35, Paragraph 3, Sentence 7

Change the sentence to read, "Early development of gas bladders by longfin smelt relative to delta smelt may enhance buoyancy and explain why longfin smelt larvae are dispersed much farther downstream in the estuary than are delta smelt larvae (Baxter pers. comm., CDFG 1992c).

Page 36, Paragraph 2, Sentence 1

Site reference CDFG 1992c for this sentence.

Page 36, Paragraph 3, Sentence 3

Herrgesell 1993 is not listed in the citations.

Page 36, Paragraph 6, Sentence 3

The limited diet for splittail is a reflection of limited sampling for food studies. A major reference to splittail was not reviewed -- Caywood, M.L. 1974. Contributions to the life history of the splittail, *Pogonichthys macrolepidotus*. M.S. Thesis California State Univ. Sacramento.

Page 37, Paragraph 2, Sentence 7

Johnson Wang's comment about spawning in tidal freshwater and oligohaline water should not be construed to mean that they can or do successfully spawn in 5 ppt water.

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Page 37, Paragraph 3

Splittail continue to use shallow water habitats throughout their lives (Meng and Moyle 1995, Baxter pers. comm.[based upon 1994 gill net survey and 1996 radio tagging]). Author should reread Meng and Moyle 1995. Although fish also use deeper, open water as they grow, much of the population continues to use shallow (<10') edge waters even as adults; a case can be made that juveniles are most common inshore.

Part of the difficulty with the splittail section is the lack of distinction between flooded ephemeral habitats (adult foraging/spawning, egg development, larval and early juvenile rearing) and shallow water habitats (juvenile/adult rearing & foraging). Larvae are forced out of flooded habitats by dropping water, but many remain in shallow water habitats.

Page 37, Paragraph 4, Sentence 1

Does the word "current" include information on the 1995 year class?

Page 37, Paragraph 5, Sentence 1

The statement "Splittail are currently confined largely to the Delta...." should be changed to "Splittail are seasonally confined largely to the Delta....and Petaluma River." Splittail make annual winter/spring migrations into the Sacramento River and move into the San Joaquin River during the winter/spring when flows are high (Baxter pers. comm.).

Page 37, Paragraph 5, Sentence 2

Replace "They" with "Adults".

Page 37, Paragraph 5, Sentence 3

Add "generally" before "splittail have been".

Page 37, Paragraph 5, Sentence 3

Historically, San Pablo has been too salty for splittail; therefore San Pablo Bay has not been part of the splittail's natural range.

Page 37, Paragraph 5, Sentence 4

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Clarify distribution shifts and their association with reduced Delta outflow.

Page 37, Paragraph 6, Sentence 3

Add "like 1995" at end of sentence.

Page 38, Paragraph 4, Sentence 1

The meaning of the sentence would greatly be enhance if "abundance" would be exchanged with "area".

Page 38, Paragraph 4, Sentence 2

Reduction in flows leading to increased salinities would force splittail to spawn in other habitats outside the marsh (less favorable is entirely subjective), reducing the likelihood of all the juveniles returning to rear in the marsh (may not decrease reproductive success). See also Young and Cech 1996. Transactions of the American Fisheries Society 125: 664-678.

Page 39, Paragraph 4, Sentence 3

"Although spawning and rearing habitat loss does not appear to be the primary mechanism...". This statement is not quite true. Certainly levee construction, bank stabilization etc. have been going on for a long time and splittail have persisted nonetheless, but access to remaining flooded terrestrial habitats is increasingly limited by diversion to storage. Increasing demand for water results in increased summer/fall draw-down of reservoirs; therefore, producing more flood storage capacity in turn reducing the frequency and duration of flooding which during the drought caused the problem of insufficient access to remaining flooded terrestrial habitat to be compounded.

Page 40, Paragraph 1, Sentence 2

Six centimeters seems a bit small for squawfish to be feeding on other fish. Please check your references to support or disprove your statement.

Page 40, Paragraph 5, Sentence 1

The statement "Rainbow trout are landlocked steelhead" mischaracterizes the life-history diversity of this species and is untrue by definition. We have artificially defined steelhead as *Oncorhynchus mykiss* that migrate to and from the ocean, and *Oncorhynchus*

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mykiss that do not exhibit anadromy are termed rainbow trout, which is also the common name of both forms, and all other forms, of *Oncorhynchus mykiss*. This nomenclature is very confusing and leads to the erroneous statements such as that cited. In reality, *Oncorhynchus mykiss* is a highly complex species that exhibits a diversity of life-history and reproductive strategies that can range from fully stream-dwelling to fully anadromous. Within this range of life-history strategies, there is a continuum of migratory behaviors i.e. anadromous, resident, adfluvial, estuarine, and coastal, that determines where, and how far, they migrate. Also, two or more life-history types inhabiting the same stream system can form one interbreeding population, and there is substantial evidence that progeny can exhibit a life-history type different from that of their parents. It would be more correct to state that "Resident rainbow trout (*O. mykiss*) are the most abundant...."

Page 40, Paragraph 5, Sentence 1

Steelhead are generally referred to as rainbow trout that migrate to sea. All steelhead are rainbow trout, but not all rainbow trout are steelhead.

Page 40, Paragraph 5, Sentence 1

Do not characterize rainbow trout as landlocked steelhead; it gives the impression that all would migrate if they could, and this is not the case. Moreover, rainbow trout in most reservoirs are a mixture of native and non-native strains due to hatchery introductions from other habitats (Eagle lake strain) and other regions (Kamloops strain from British Columbia).

Page 41, Paragraph 3-5

Quite a bit is known about population status in the delta. Age composition and growth data are available. Survival rate for fish ≥ 225 mm is 63%; harvest rate is only about 6% because about 80% of the fish caught by sport anglers are released alive.

Page 41, Paragraph 5, Sentence 1

Delete "In recent years" since your reference document is from 1974. Also, the spelling of the author's name is "Geldern".

Page 41, Paragraph 5, Sentence 6

There is evidence that the Delta population is doing well.

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Page 42, Paragraph 2

In the 1970s, tule perch were common in the small sloughs of the Napa and Suisun marshes.

Page 42, Paragraph 3, Sentence 2

Moyle et al. 1995 is not in Literature Cited.

Page 42, Paragraph 3, Sentence 2 & 3

Tule perch are common in turbid Suisun and Napa Marsh sloughs.

Page 42, Paragraph 6, Sentence 2

White catfish are not difficult to catch. It is unbelievable that Moyle could have printed such a statement. Please check your references again.

Page 42, Paragraph 6, Sentence 7

White catfish occur there but "common" is a real "stretch".

Page 42, Paragraph 6, Sentence 7

White catfish are most common in the South Delta channels with moderately fast currents.

Page 43, Paragraph 3

The following references should be consulted for this section, the Status and Trends Report is an incomplete reference: Calif. Dept. of Fish and Game 1992c.

Estuary Dependent Species; WRINT DFG-6 for the State Bd 1992 hearing, and Radtke 1966.

Distribution of smelt, juvenile sturgeon and starry flounder in the Sacramento-San Joaquin Delta with observations on food of sturgeon. pp 115-129 in J.L. Turner and D.W. Kelley.

Ecological Studies of the Sacramento-San Joaquin Delta Part II: Fishes of the

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Delta. Calif. Dept of Fish and Game Fish Bulletin 136.

Page 43, Paragraph 3, Sentence 4

Change the sentence to read, "... larvae move into the Bay on currents and disperse into the upper reaches of the Delta, Suisun and San Pablo Bays." The Delta and other freshwater areas of the Bay is and has been important rearing habitat for age-0 starry flounder, and some older fish.

Page 43, Paragraph 3, Sentence 5

The sentence is inconsistent with the concept that most starry flounders spawn in the ocean.

Page 43, Paragraph 4

Historically, adults have also been common in Suisun Bay.

Page 43, Paragraph 2, Sentence 3 & 4

Correct the spelling of "creosote".

Page 45, Paragraph 6 (Bay Shrimp), Sentence 1

Change the sentence to read as follows, "Bay shrimp (C.f.) are most abundant in brackish water portions of the Bay, particularly Suisun and San Pablo Bays, but their habitat can include the Delta during low outflow years." Review CDFG 1992c as this is the original source for data in Herbold et al. 1992.

Page 46, Paragraph 1, Sentence 3

Change "several" to "many". Exclude American shad and white catfish and include starry flounder.

Page 46, Paragraph 2, Sentence 3

San Pablo and San Francisco Bays aren't heavily populated by mysids but these bays are populated with bay shrimp. This association between bay shrimp and mysid shrimp should be reevaluated.

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Appendix A. Definitions of Environmental Variable

Specific Comments

Page A-1, Paragraph 5, Tidal Flow, Sentence 5

Was the term "hydrodynamic" or "Delta hydraulics" not used for a specific reason?

Page A-3, Paragraph 4, Water Temperature, Sentence 3

Change "including shading by riparian vegetation" to read "including microclimate influences of riparian vegetation".

Page A-3, Paragraph 5, Thermal Pollution, Sentence 2

Future in-Delta water storage facilities discharge should be discussed under reservoir operations.

Page A-3, Paragraph 6, Dissolved Oxygen

Proposed addition to paragraph: "Discharge from future in-Delta water storage reservoirs could also reduce DO levels."

Page A-4, Paragraph 3, Predation

More important than predation by non-native species, is that structures and other physical habitat along with flow characteristics can concentrate predators and increase predation rates.

Page A-4, Paragraph 4, Competition, Sentence 3

Include the following underlined phrase, "already stressed by other factors including loss and fragmentation of habitat may be less able...".

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Thank you for the opportunity to review and comment on the CALFED's Draft Programmatic Environmental Impact Report/Environmental Impact Statement Environmental Impacts Technical Report Fisheries and Aquatic Resources and the Draft Affected Environment Technical Report for Fisheries and Aquatic Resources. If there are any questions call Mr. Frank Wernette of my staff at (209) 948-7800 or CALNET 8-423-7800.

Sincerely,

Pete Chadwick
CALFED Liaison

cc:

Mr. Nick Villa, R-2
Mr. Bill Loudermilk, R-2
Mr. Harry Rectenwald, R-1
Mr. Jim White, ESD
Mr. Carl Wilcox, R-3
Mr. Alan Baracco, IFD
Mr. Dale Sweetnam, BDD
Mr. Randy Baxter, BDD
Mr. Dave Kolhourst, BDD
Mr. Don Stevens, BDD
Ms. Kathy Hieb, BDD
Ms. Heather McIntire, BDD
Ms. Laurie Briden, BDD

bc: Ms. Maureen McGee, BDD